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# GLOSSARY

**Absolute, AEC, or CWS Filter**—Obsolete terms for HEPA filters.

**Acceptance Test**—A test made upon completion of fabrication, installation, repair, or modification of a system unit, component or part to verify to the user or owner that the item meets specified requirements.

**Adsorber**—A device for removing gases or vapors from air by means of preferential physical condensation and retention of molecules on a solid surface. Adsorbers used in nuclear applications are often impregnated with chemicals to increase their activity for organic radioactive iodine compounds.

**Adsorber Cell**—A modular replaceable adsorber element.

**Aerosol**—A dispersion of very small particles and/or droplets in air.

**Air Cleaning Stage**—An Air cleaning stage is a single component or a bank of identical components in an air cleaning unit or an air cleaning system. A system that has one bank of components (e.g., HEPA filters) in each of three air cleaning units, arranged in parallel, is a single stage system. A multistage unit or system has two or more stages in tandem.

**Air Cleaning System**—An air cleaning system is an assembly of one or more air cleaning units plus all external components needed to convey air or gases from one or more intake points, through the air cleaning units, to one or more points of discharge. The system may be either recirculating or once through.

**Air Cleanup System**—A system provided to decontaminate the air in, or exhausted from, a contained space following a system upset or prior to personnel access to the contained space.

**Air Cleaning Unit**—An air cleaning unit is an assembly of components, which comprises a single subdivision of a complete air cleaning system, including all components necessary to perform the air cleaning function of that subdivision.

**ALARA**—As Low As Reasonably Achievable. The design philosophy used to determine the need for, or extent of, air cleaning and off-gas facilities, based on their cost effectiveness in reducing adverse impact with respect to offsite and onsite dose criteria. Formerly known as ALAP.

**Array**—An array is the arrangement of internal components in a bank, expressed as the number of components across the width of a bank times the number high (e.g., a 4 by 3 array of HEPA filters).

**Bag-in/Bag-out**—A method of introducing and removing items from a contaminated enclosure that prevents the spread of contamination or opening of the contaminated space to the atmosphere through the use of plastic bagging material.

**Blinding**—Water vapor or droplets that interfere with particulate capture.

**Case, Casing**—The frame or cell sides of a modular filter element.

**Clean-Air Device**—A clean bench, clean workstation, downflow module, or other equipment designed to control air cleanliness (particle count) in a localized working area and incorporating, as a minimum, a HEPA filter and a fan.

**Clean Room**—An occupied room designed to maintain a defined level of air cleanness under operating conditions; inlet and recirculated air is cleaned by HEPA filters.

**Coating**—Paint or other protective surface treatment applied by brushing, spraying, or dipping (does not include electro plating).

**Combustible**—A material that will ignite and burn in the form that it is used.

**Combustible Liquid**—A liquid with a high flash point, greater than 100 degrees F. The flash point is the temperature of the liquid above which vapors will be released that can be ignited by a flame source.

**Component**—A component is a filter, adsorber cell, fan, damper, or other basic element of an air cleaning system which cannot be disassembled without nullifying the capability of performing its designed task.

**Confinement (contained volume)**—A building, building space, room, cell, glovebox, or other enclosed volume in which air supply and exhaust are controlled, and typically filtered.

**Confined Space**—A space that: (1) is large enough and so configured that an employee can bodily enter and perform assigned work; (2) has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits); and (3) is not designed for continuous employee occupancy. Also, an enclosure that contains an oxygen deficiency, where oxygen concentration is less than 19.5 percent.

**Containment (containment vessel or building)**—A gastight enclosure around a nuclear reactor or other nuclear facility designed to prevent fission products from escaping to the atmosphere. Typically, when a containment vessel or building is exhausted, it occurs through an engineered filtration system.

**Contamination**—Any unwanted material in the air, in process fluids, or on surfaces. For the purposes of this handbook, contamination is usually assumed to be radioactive.

**Contamination Zone**—An isolable area which is, or which could become, contaminated and which is designed to facilitate decontamination.

**Controlled Area**—An area to which access is restricted.

**Cover Gas**—An inert gas, under pressure, provided in a contained space or process equipment item to prevent inleakage of air.

**Criticality**—The state of sustaining a chain reaction, as in a nuclear reactor. When fissionable materials are handled or processed, they must be kept in a subcritical geometry, configuration, or mass to avoid accidental criticality.

**Critical System, Unit, or Item**—One that is essential for adequate or safe operation, failure of which would cause loss of function.

**Decay Heat**—The heat produced by radioactive materials as nuclides spontaneously transform into other nuclides or into different energy states. Each decay process has a definite half-life.

**Decontamination**—The removal of unwanted substances from personnel, rooms, building surfaces, equipment, etc.

**Decontamination Factor**—A measure of air cleaning effectiveness; the ratio of the concentration of a contaminant in the untreated air or gas to the concentration in the treated air or gas.

**Demister**—A device designed to collect and divert moisture away from downstream filters (i.e., prefilters, HEPA's, and adsorbers). Demisters are installed in final filter plenums upstream of the first stage HEPA filters to prevent water damage to the filters.

**Design Basis Accident (DBA)**—The most serious accident that can be hypothesized from an adverse combination of equipment malfunction, operating errors, and other unforeseen causes.

**Design Pressure**—The pressure that is used for the structural design of a unit, component, or system, and which includes allowance for forces encountered under system upset conditions.

**Monodisperse Aerosol**—An aerosol generated by controlled vaporization and condensation of liquid test agent to give a cloud of droplets with diameters of approximately 0.3 micrometers.

**Polydisperse Aerosol**—An aerosol generated by blowing compressed air through liquid test agent and exhausting through special nozzles under controlled conditions to produce a cloud of droplets with a light-scattering mean diameter of approximately 0.7 micrometers.

**Dose**—The amount of ionizing radiation energy absorbed per unit mass of irradiated material at a specific location. In the human body, it is measured in Roentgen equivalent man (rems); in inanimate bodies, it is measured in radiation absorbed dose (rad).

**Efficiency**—Is defined as treated air concentration ÷ untreated air concentration x 100.

**Enclosed Filter**—A filter that is completely enclosed on all sides and both faces except for reduced end connections or nipples for direct connection into a duct system. Enclosed filters are installed individually because there is a separate run of duct to each filter unit.

**Engineered Safety Feature (ESF)**—A unit or system that is provided to directly mitigate the consequences of a DBA.

**Extended-Medium Filter**—A filter having a pleated medium or a medium in the form of bags, socks, or other shape to increase the surface area relative to the frontal area of the filter.

**Face Guard**—A screen, usually made from 4-mesh galvanized hardware cloth, permanently affixed to the face of a filter unit to protect it against damage caused by mishandling.

**Face Shield**—A screen or protective grille placed over a filter unit after it is installed to protect it from damage that might be caused from operations carried on in the vicinity of the filter.

**Fail Safe**—A design to give equipment the capability to fail without producing an unsafe condition.

**Filter**—A device having a porous or fibrous medium for removing suspended particles from air or gas that is passed through the medium.

**Filter/Adsorber Bank**—A parallel arrangement of filters/adsorbers on a common mounting frame installed within a single housing.

**Final Filter**—The last filter unit in a set of filters arranged in series.

**Fire Resistance Rating**—A term associated with the qualification of fire barriers. Fire barriers are tested to a standard fire exposure detailed in ASTM E-119, *Standard Method of Fire Tests of Building Construction and Materials*.

**Flammable Liquid**—A liquid with a low flashpoint, less than 100° F. These liquids are a greater fire hazard than combustible liquids, because they will readily burn at room temperature or below.

**Flame Spread Rating**—A term associated with the qualification of exposed interior finish materials. Materials are tested to determine their flame spread rating by a standard test in ASTM E-84, *Standard Test Method for Surface Burning Characteristics of Building Materials*.

**Functional Design**—The establishment of airflow rates, airflow capacities, types of components to be employed, general system layout, operational objectives and criteria, decontamination factors and rates, space allocations, and other overall features of a system.

**Gallons per Minute (gpm)**—This is a measurement of the quantity of water flowing through a pipe. The design specifications of water spray and sprinkler systems are based on the quantity of water flowing through the pipes and out of the nozzles.

**Gas Chromatograph**—An analytical instrument used for quantitative analysis of extremely small quantities of organic compounds whose operation is based upon the absorption and partitioning of a gaseous phase within a column of granular material.

**Gas Residence Time**—The calculated time that a contaminant or test agent theoretically remains in contact with an adsorbent, based on active volume of adsorbent and air or gas velocity through the adsorber bed.

**High-Efficiency Particulate Air Filter or HEPA Filter**—A throw-away extended-pleated-medium dry-type filter with: (1) a rigid casing enclosing the full depth of the pleats, (2) a minimum particle removal efficiency of 99.97 percent for particles with a diameter of 0.3 micrometers, and (3) a maximum pressure drop of 1.0 in.wg. or 1.3 in.wg. when clean and operated at its rated airflow capacity.

**Hot cell**—A heavily shielded and environmentally controlled enclosure in which radioactive materials can be handled remotely with manipulators and viewed through shielding windows to limit danger to operating personnel.

**In-place Leakage Test**—A system or bank test for leakage of filter units or charcoal adsorbers made after they are installed.

**Ionizing Radiation**—Any radiation (alpha, beta, or gamma) that directly or indirectly displaces electrons from the outer domains of atoms.

**Isotope**—One of several forms or nuclides of the same chemical element that have the same number of protons in the nucleus and therefore have the same chemical properties, but have differing numbers of neutrons and differing nuclear properties.

**Leaktightness**—The condition of a system unit or component where leakage through its pressure boundary is less than a specified maximum value at a specified pressure differential across the pressure boundary.

**Lower Flammable Limit (LFL)**—The least amount of a flammable vapor or gas that will support combustion when mixed with air. The LFL is usually expressed in volume per cent. Mixtures that contain less than the LFL of a material are too lean to burn.

**Medium** (plural, media)—The filtering material in a filter.

**Mounting Frame**—The structure to which a filter unit is clamped and sealed.

**Noncombustible Materials**—Materials that under ordinary conditions will not burn. Composite materials are determined to be noncombustible if they successfully pass the test criteria contained in ASTM E-136, *Test for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C*.

**Nuclear Reactor**—An apparatus in which a chain reaction of fissionable material is initiated and controlled.

**Off-gas**—The gaseous effluent from a process or operation.

**Open-Face Filter**—A filter with no restrictions over the ends or faces of the unit, as opposed to the enclosed filter with reduced-size end connections.

**Operating Pressure**—The desired pressure corresponding to any single condition of operation.

**Overpressure**—Pressure in excess of the design or operating pressure.

**Particle, Particulate**—A minute piece of solid matter having measurable dimensions.

**Penetration**—The measure of the quantity of a test agent that leaks through or around an air cleaning device when the device is tested with an agent of known characteristics under specified conditions.

**Poison**—Any material that tends to decrease the effectiveness of an adsorbent by occupying adsorption sites on the surface of the adsorbent or by reacting with the impregnants in the adsorbent.

**Prefilter**—Prefilters are throwaway type filters that are located upstream of HEPA filters. Prefilters are intended to collect and hold the larger airborne particles that are in the passing airstream. Prefilters are sometimes called roughing filters.

**Production Test**—Test made on each item or a sample of items or product from a production run to verify that the item meets specification requirements.

**Permanent Single-Unit (PSU) Adsorber**—An adsorber that is permanently installed in a system and that can be emptied of and refilled with adsorbent without removing it from the system.

**Pyrophoric Material**—Materials or compounds in a form that will ignite in air at a temperature of 150° C or below in the absence of external heat, shock, or friction.

**Qualification/Proof of Design Test**—A periodic test made on a product or equipment item when it is proposed as a candidate to meet certain service requirements, which will verify to the user or owner that the item can meet his requirements (see production test).

**Rad**—Radiation Absorbed Dose, the basic unit of ionizing radiation. One rad is equal to the absorption of 100 ergs of radiation energy per gram of matter.

**Radiation**—The propagation of energy through matter or space in the form of electromagnetic waves or fast-moving particles (alpha and beta particles, neutrons, etc).

**Radioactivity**—The spontaneous decay or disintegration of an unstable atomic nucleus accompanied by the emission of radiation.

**Rated Airflow**—The manufacturer's assigned design airflow capacity of a HEPA filter at a “not to exceed” designated clean filter resistance. With a media velocity limit of 5 feet per minute, the rated airflow is obtained by multiplying the filtration velocity of 5 feet per minute by the effective area of filter media.

**Recirculation Air Cleanup System**—An air cleaning system that recirculates the air of a contained space.

**Redundant Unit or System**—An additional and independent unit or system, which is capable of achieving the objectives of the basic system and is brought online in the event of failure of the basic system.

**Rem**—Roentgen Equivalent Man. The unit of absorbed radiation dose in rads multiplied by the relative biological effectiveness of the radiation.

**Roughing Filter**—A prefilter with high efficiency for large particles and fibers but low efficiency for small particles; usually of the panel type.

**Safety-class Structures, Systems, and Components (SC SSCs)**—Structures, systems, or components including portions of process systems, whose preventive and mitigative function is necessary to limit radioactive hazardous material exposure to the public, as determined from the safety analyses.

**Safety-significant Structures, Systems, and Components (SC SSCs)**—Structures, systems, and components which are not designed as safety-class SSCs but whose preventive or mitigative function is a major contributor to defense in depth and/or worker safety as determined from safety analyses.

**Scrubber**—A device in which the gas stream is brought into contact with a liquid so that undesirable components in the gas stream are removed by reacting with or dissolving in the liquid.

**Separators**—Corrugated foil (usually aluminum) used to separate the folds of a pleated filter medium and to provide air channels between them.

**Service Environment**—The aggregate of conditions (temperature, pressure, humidity, radioactivity, chemical contaminants, etc) to which the components of a system are exposed.

**Shielding**—A mass of absorbing material placed around a radioactive source to reduce ionizing radiation to levels.

**Shock Overpressure**—The pressure over and above atmospheric or operating pressure produced by a shock wave from an explosion, a suddenly closed damper, or other event.

**Single-Component Air Cleaning Unit**—A single-component air cleaning unit is one in which there is only one component (HEPA filter, prefilter, etc.) per stage, as opposed to a bank installation in which there are two or more components per stage.

**Smoke Developed Rating**—The numerical value assigned a material tested to the ASTM E-84 flame spread test method.

**Specific Radioactivity**—Radioactivity per unit weight of a material with an isotope.

**Surveillance Test**—A test made periodically to establish the current condition of a system, unit, component, or part.

**Test Program**—A formalized schedule of tests, which specify the test sequence, the procedures to be employed, and the acceptance criteria.

**Train**—A set of components arranged in series.

**Treatment**—The process of removing all or a part of one or more chemical components, particulate components, or radionuclides from an off-gas stream.

**Ventilation System**—The ventilation system includes the total facilities required to supply air to, circulate air within, and remove air from a building or building space by natural or by mechanical means.